# PRECISION DUAL MITER SANDER

Alan R. Peters
Rosemary Peters
16314 Estuary Court
Bokeelia , Fl. 33922
(239)-283-4917





This sanding machine will accomplish , by orienting the sanding disc in a horizontal plane & providing a vertical guiding surface with precision located rows of guide pins oriented at 45 degrees to the disc on both sides of the vertical plate will accommodate , the sanding of two (2) molding miters at the same time without the need to reposition any guides . Because all the surface of the disc is exposed (except for area under the vertical plate) sanding of the moldings can be accomplished in such a manner that sanding is always in a downward direction

from the top surface of the sanded molding on each side of the vertical guide plate with the motorized v-belt driven disc always rotating in one direction . Fig. (1)

An additional slip on multi-angle guide can be utilized to accommodate sanding of any angle up to 90 degrees

FIG 12-16 A vacuum hose attachment plate & fitting is provided to keep the disc & surrounding work area clean .

Fig. 11

The drive motor could be mounted as shown Fig. (1) on the top surface of the machine or below the bottom if the machine is set up to use the available wall mounting brackets .

By having the disc almost entirely exposed , the sanding pad can be removed & replaced without disassembling any of the precision components as described on page .

The sanding disc can be adjusted to obtain a precise 45 degree angle to the row of guide pins on either side of the vertical plate & can also be adjusted to obtain precise perpendicular angle on both sides of the vertical plate by an arrangement of a floating bearing plate that contains precision , pre loaded , ball & roller bearings connected to & supporting the disc . This plate can be tilted in any direction by the adjustment of four ( 4 ) , more or less , jack

screws and four ( 4 ) , more or less , clamping screws accessible from the underside of the sander & located on the main cross bar that connects the base & the vertical plate to the disc . Fig. (6)

The disc RPM is controlled by the known motor RPM with attached v-belt pulley diameter & the v-groove machined into the diameter of the disc to create an approximately 1 : 10 ratio or about 200 RPM ( this can be readily changed by replacement of the motor pulley ) Fig. (6)

I have found , through testing , that this slower speed is advantageous when sanding fillets or small miters ( or other delicate small miters ) and plastic composition moldings as it will not melt the mitered edges as would a high speed sander (approx. 1750 RPM ) . This slower speed with its ratio reduction allows the use of a lower horsepower drive motor that produces the necessary force to sand large hardwood or aluminum moldings .

The pivotal motor is mounted to a bracket secured to the base . The bracket contains a motor tensioning bolt & jam nut for correctly setting the v-belt tension . Fig. (7)

The disc bearings are pre - loaded by means of a central screw within the bearing retainer washer that screws into the bearing shaft mounted to the floating bearing plate . This screw is secured in place by means of a jamming set screw threaded into the same threaded hole as pre - load screw from the opposite end of the bearing shaft accessed from the underside of the sander . Fig. (6)

## BACKGROUND OF INVENTION

Disc sanders are commonly known machines used in the picture framing , woodworking , cabinetry and other industries . Disc sanders are normally used with their discs operating in a vertical plane & their guide plates affixed to the sanders in a horizontal plane approximately at the centerline of the rotating disc , exposing only the upper area of the disc for use . In some versions , the area below the guide plate is enclosed around the disc and having a vacuum attachment while others have no enclosure and simply drop the residue on the floor . Most motorized sanders operate at a high rotational speed , approximately 1750 RPM , which is not desirable for sanding off minor amounts or delicate pieces . Manual sanders normally do not have vacuum attachments and are tiresome to use . When sanding mitered angles of a picture frame molding for example ; the back surface would be set against the horizontal guide surface with the outter surface of the moulding against a 45 degree , or other angle , guide allowing the mitered end to contact the disc . The sanding disc rotates in a direction to always sand towards the upper surface of the moulding so as not to create burrs on the top surface of the moulding . To sand the opposite end of the moulding piece , the outside surface guide will need to be slid or pivoted to form the opposite angle positioning . The moving or re-positioning of guides while performing a precision operation can be detramental to performance & is time consuming .

**Background of Invention (pg2)**

In the sanders so far described only one quadrant , or ¼ , of the total disc surface can be utilized at one time . Accordingly , this invention , by incorporating a horizontal sanding disc and a vertical (2) two sided guide plate with fixed 45 degree angle rows of guide pins on both sides , allows the sanding of the opposite ends of (2) two moulding pieces at the same time . This configuration also allows usage of (2) two quadrants (¼ + ¼ ) of the entire sanding disc area . One quadrant (up to ¼ ) of the disc area is used for operation of the vacuum plate . The configuration of the disc , in cooperation with its bearings and mounting plate , allows for adjustment of the disc axis to align it with the 45 degree guide pins and the vertical guide plate .

## Brief Descrition of Drawings

Fig **1** Is a prospective view of the machine from the rear & left side so as to show the greater amount of features .

Fig **2** Is a plan view of the machine showing the base , the circular sanding disc , the pivotable drive motor , the vertical guide plate & the vacuum plate .

Fig **3** Is a frontal view along line **3-3** showing the base , the vertical guide plate , the pivotable drive motor with mounting bracket , and the mounting feet .

Fig **4** Is a right side end view along line **4-4** showing the base with rubber feet , the vertical guide plate with guide pins & mitered moulding , shown in phantom , in allignment with guide pins .

Fig **5** Is a left side view along line **5-5** showing the base with mounting feet , the vertical guide plate with pins & mitered moulding , shown in phantom , in allignment with guide pins , and the pivotable motor & mounting bracket

Fig **6** Is a bottom view along line **6-6** showing the underside of the machine base, the circular disc with it's supporting crossbar mounting plate, the motor drive pulley, the drive belt , the circular disc allignment screws , and the locking screws .

## Breif Description of Drawings (pg 2 )

Fig 7 Is a sectional view along line **7-7** showing the base, the vertical guide plate, the cirular sanding plate with support plate , the riser blocks , the bearing plate , bearings & other components .

Fig **8** Is an enlarged setional view along line **8-8** showing the circular disc with bearings , support plate , allignment & locking screws , and other components .

Fig **9** Is an enlarged fragmented sectional view along line **9-9** showing the the base , vertical guide plate , riser block , circular disc , cross bar mounting plate, vacuum plate , base end cap with attachment screws , and mounting feet .

Fig **10** Is a sectional view along line **10-10** showing the base , vertical guide plate, vacuum plate , pivotable drive motor , drive pulley , v-belt , and other components .

Fig **11** Is a fragmented sectional view along line **11-11** showing the disc and vacuum plate .

## Brief Description of Drawing (pg 3)

Fig **12** Is an end view along line **4-4** showing the multi-angled guide in use on the left hand side of the machine set up for the moulding of an eight sided frame .

Fig **13** Is an end view along line **5-5** showing the multi-angled guide in use on the right hand side of the machine .

Fig **14** Is a fragmented top view along line **14-14** showing the multi-angle guide and pins in cooperation with vertical guide plate .

Fig **15** Is a plan view of a multi-angle guide plate

Fig **16** Is a side view along line **16-16** of a multi-angle guide plate

## DETAIL DESCRIPTION OF DRAWINGS

Turning to Fig **1** through **5** what is shown is a sanding machne comprised of a formed sheet metal base **1** with formed sheet metal end caps **2 & 3** attached to base **1** by screws **18** . A motor mounting plate **22** is attached to the base **1** by means of screws **37** . A pivotable motor **21**with cord & plug **33** is mounted to the motor plate **22** by means of bolt **17** and nut **23** . The pivoting of the motor **21** , or tensioning , is accomplished by adjusting the screw **15** threaded through mounting plate **22** and contacting the motor base plate . When correct belt **27** tension is accomplished , the jam nut **14** is locked against mounting plate **22** .

A vacuum plate **11** with a cylindrical flange for attaching a vacuum hose **13** is mounted on the upper surface of the base **1** and attached by means of screw **12** passing through the base **1** & threading into riser block **35** (also shown in Fig **11** ). Mounted to the top surface of the base **1** is vertical guide plate **5** with the cooperating horizontal guide pins **7 , 8 , 9 & 10** positioned so as to create an essentially 45 degree angle to the top surface of base **1** . Pins **7 & 8** create a locating line on the right side of the vertical plate **5** for the outside surface of a picture frame moulding **B** (and the like) , while the right side of the vertical plate **5** serves as a locating surface for the bottom surface of moulding **B** , pins **9 & 10** corespondingly create the same function on the left side of vertical guide plate **5** for moulding **A** . Horizontally located , slightly below the bottom surface of the vertical guide plate **5** and the top surface of base **1** , is a circular disc **4** with a sanding pad **6** adhered to its top surface . A clearance hole **19** in the top surface of base **1** allows access to the pad **6** for mouldings **A & B** .

## Detail Description of Drawings (pg 2)

Turning to Fig **6** through **10** the disc **4** has a groove on its outter perimeter to accept a V-shaped , or the like , drive belt **27** cooperating with a smaller drive pulley **26** attached to shaft **41** of drive motor **21** by means of screw **25** . The larger diameter of the V-belt driven disc **4** allows for a speed reduction between the motor driven pulley **26** to approximately 220 disc **4** RPM thus providing a more desirable working speed for delicate sanding . At the center of disc **4** is a hole **65** for acceptance of bearing **40** and a counterbored clearance hole **66** for acceptance of a bearing snap ring ( or bearing shoulder ) **43** that seats on the surface **67** to establish a predetermined depth location for bearing **40** . Engaging the lower surface of disc **4** is a cylindrical roller bearing washer **45** centrally located by the outside diameter of bearing **40** and in cooperation with needle roller bearing & cage **44** and the bearing washer **45** that is in contact with bearing **44** and plate **38** ,and is centrally located by spacer **46** . This configuration provides a thrust load capacity far in excess of what would normally be required .

The bearing **40** is centrally located by the coooperation of bearing shaft **41** in the center of bearing plate **38** that is located centrally atop of cross bar plate **28** . The bearing **40** is retained and preloaded by retainer **47** that is secured into place by preloading screw **48** and locked at correct preload by jam screw **32** . O-ring **39** creates a seal between disc **4** and bearing plate **38** and is centrally located by outter perimeter of the cage of bearing **44** . This O-ring **39** acts to seal in bearing **44** grease and seal out other contaminants .

The floatably mounted bearing plate **38** is secured by means of 4 ( more or less ) screws **30** passing through plate **28** and threading into plate **38** . Four ( 4 ) ( more or less ) jacking screws **31** are threaded into plate **28** and contact the lower side of plate **38** in a location central to the inner

diameter and outter diameter of the roller bearing **44** .

**Detail Description of Drawings (pg 3)**

The jacking screws **31** working in cooperation with mounting screws **30** allow the tilting , in any direction about its axis , of the entire disc **4** & bearings assembly to bring the disc into exact orientation with the 45 degree angle crreated by the pins **7 , 8 , 9 , & 10** located in the vertical guide plate **5** and into perpindicularity with the moulding locating surfaces of the vertical guide plate **5** .

The cross plate **28** carrying the disc **4** and bearing assembly is mounted at its ends to riser block **35** by means of screws **16** passing through plate **28** and threaded into block **35** .

The sub-assembly of the disc **4** , V-belt **27** , bearing assembly , cross bar **28** , and riser blocks **35** are slid into the open end of base **1** and attached to the base **1** by means of screws **16** that pass through the top surface of the base **1** and thread into block **35** .

Screws **29** pass through clearance hole **36** in the lower legs of base **1** and pass through plate **28** and block **35** to thread into vertical guide plate **5** creating a rigid unit of all the critical components of the invention .

Screws **18** pass through the top surface of base**1** and thread into end caps **2 & 3** . Screws **18** pass through feet **20** and through the lower surface of base **1** and thread into end caps **2 & 3** to rigidize the sheet metal components .

**Detail Description of Drawings (pg 4)**

Fig **11** is showing the relationship of vacuum plate **11** to the pad **6** affixed to disc **4** thus forming a small air gap between the lower surface of plate **11** and pad **6** to create a high speed air flow area created by the vacuum hose **13** attached to the circular flange on the top surface of plate **11** so as to evacuate sanding residue from the working area of the pad **6** .

Turning to Figures **12** through **16** what is shown is an essencially triangular plate (Fig **15 & 16** ) used in cooperation with vertical guide plate **5** and pins **7 , 8 , 9 & 10** of a thickness equal to or greater than the protrusion of pins **8 & 10** from their coresponding surfaces of plate **5** . Three (3) (more or less ) pins **51** are pressed into holes **65** located on the same centerline with holes **52 & 57** to form a straight line . Hole **52** is used for slidability locating plate **50** on pin **7** then rotating plate **50**about pin **7** into orientation with holes **52 , 54 , 55 , 56 ,** or **62** to create a differing predetermined working angle for moulding(s) **B**of varying mitered angles that corespond to the number of sides of a frame . The plate **50** would be slid onto pins **7 & 8** so that the surface **64** would be in contact with vertical plate **5** .

The moulding **B** would then be placed with its bottom surface on surface **63** of plate **50** and with its outside surface against pins **51** for correct orientation ; for example , to sand the angle of moulding **B** for an eight sided picture frame , the plate **50** would be located with hole **52** on pin **7** and hole **55** on pin **8** to form a 22 degree 30 minute miter angle . Hole **55** coresponds with the numeral **8** and its associated line on plate **50** representing an 8 sided frame .

## Detail Description of Drawings (pg 5)

The same plate **50** can be used on the left side of plate **5** for sanding the moulding **A** in the same 22 degree 30 minute configuration by locating hole **57** on pin **9** and hole **60** on pin **10** . Therefore , as can be seen on plate **50** , holes **52 & 58** and their coresponding numeral 5 are used for five (5) sided frames , holes **54 & 59** for six (6) sided frames , holes **56 & 61** for twelve (12) sided frames, and hole **62** for setting up to sand at 90 degrees to the disc **4** and pad **6** .

## Detail Description of Drawings (pg 6)

Turning to Figures **12** through **16** what is shown is an essentially triangular plate ( Fig **15** & **16** ) used in cooperation with vertical guide plate **5** and pins **7 , 8 , 9 , & 10** of a thickness equal to or greater than the protrusion of pins **8 & 10** from their coresponding surfaces of plate **5** . Three (3) pins **51** are pressed into holes **65** located on the same centerline with holes **52 & 57** to form a staight line . Hole **52** is used for slidability locating plate **50** on pin **7** then rotating plate **50** about pin **7** into orientation with holes **53 , 54 , 55 , 56 ,** or **62** to create a differing predetermined working angle for moulding (s) **B** of varying mitered angles that corespond to the number of sides of a frame . The plate **50** would be slid onto pins **7 & 8** so that the surface **64** would be in contact with vertical plate **5** . The moulding **B** would then be placed with its bottom surface on surface **63** of plate **50** and with its outside surface against pins **51** for correct orientation ; for example , to sand the angle of moulding **B** for an eight (8) sided picture frame , the plate **50** would be located with hole **52** on pin **7** and hole **55** on pin **8** to form a 22 degree 30 minute miter angle . Hole **55** coresponds with the numeral **8** representing an 8 sided frame and its associated line on plate **50** .

## Detail Description of Drawings (pg 7)

The same plate **50** can be used on the left side of plate **5** for sanding the moulding **A** in the same 22 degree 30 minute configuration by locating hole **57** on pin **9** and hole **60** on pin **10** . Therefore , as can be seen on plate **50** , holes **53 & 58** and their coresponding numeral 5 are used for five (5) sided frames , holes **54 & 59** for six (6) sided frames , holes **56 & 61** for twelve (12) sided frames , and hole **62** for setting up to sand at 90 degrees to the disc **4** and pad **6** .